DOCUMENT RESUME

ED 191 896 TM 800 520

AUTHOR Haase, Richard F., And Others
TITLE Maximizing the Validity of Holland's Classification System.
PUB DATE Sep 79
NOTE 10p.; Paper presented at the Annual Meeting of the American Psychological Association (88th, New York, NY, September 1-5, 1979).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Career Counseling; *Classification; *Discriminant Analysis; Higher Education; Interest Inventories; *Occupational Aspiration; *Occupational Tests; *Predictive Validity
IDENTIFIERS *Holland Self Directed Search; *Holland Vocational Preference Inventory

ABSTRACT

Discriminant analysis of Holland's Self Directed Search and Vocational Preference Inventory significantly improved the predictive validity of his classification scheme, over the traditional method of assigning high point codes. These results were obtained with both an initial and a replication sample of undergraduates pursuing various degrees. The average increase in classification accuracy from discriminant analysis over that obtained from high point codes of one letter was about 16%. The criterion for forming discriminant groups in this study was the subject's own choice of anticipated occupation. The full theoretical sophistication of the six-letter high point code can be achieved without the use of the 720-cell design as would be required in the high point code method. Using discriminant analysis, one can make inferentially stable predictions with as few as 60 subjects and have better than reasonable confidence that the results would replicate on an independent sample. (Author/CP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

CP0002858

ED191896

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Maximizing the Validity of Holland's Classification System

Richard F. Haase Jane L. Winer,
Christopher M. Glenn and Carolyn F. Reed
Texas Tech University

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
R. Haase

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

TM 800520

Running head: Maximizing

Abstract

Two approaches to the classification of subjects in vocational research and counseling by means of Holland types were compared. The traditional classification by high point codes was compared to a prediction schema based upon discriminant analysis. A discriminant function employing information from all six scales of the VPI and SDS (Occupations Scale) was significantly more accurate in classifying subjects against their expressed vocational aspirations than was the Holland scheme using high point codes. An independent replication of the procedure with a new sample yielded highly similar results. Application to research and practice are discussed.

Maximizing the Validity of Holland's Classification System

Holland's theory of vocational choice (1973) is one of the most heuristic theories of vocational choice extant. It has served an especially important function in the vocational research literature through the widespread use of well-developed and well validated measures of the theoretical constructs embodied in the system, i.e., the VPI and SDS (Holland, 1972, 1975).

The beginning point of research with the Holland classification system entails the assigning of the proper high point code to the persons, environments, occupations, or fields of study of interest in the research. This procedure has been well outlined in Holland's work (1973) and is not repeated here, suffice it to say that the object of interest is described and classified according to its resemblance to one of the six types articulated by Holland. Several high point codes are possible, ranging from the single dominant letter code, which provides for six categories, to that employing all six types which would allow for 720 discrete classification patterns. The 720 cell classification pattern, using all information about a given subject on all six types, is clearly the most sophisticated, but would require an inordinate number of subjects in order to complete the picture for any given research project. Use of the one letter code does not require the sheer number of observations implied above, but is, in theory, a less accurate classification scheme. Several studies employing variations of the scheme have been reported in Holland (1972, 1975) and demonstrate that in general one can expect accuracy of classification against a variety of criteria in the range of 35% to 60% with an average of about 40%.

An alternate strategy for treating the data from a Holland type study which maximizes the use of the entire data set (720 cells of a six letter high point code) and does so without requiring the prohibitive number of observations otherwise required is the multivariate technique of discriminant analysis. In essence, discriminant analysis forms a linear combination of predictor variables which maximally predicts a criterion by maximizing between group differences relative to within group variance (Timm, 1975). Hence an investigator can employ all six pieces of information about a subject on the VPI or SDS in predicting some external validation criterion with this technique. Moreover, one can make inferentially stable predictions on the basis of sample sizes in the neighborhood of 60+.

Two studies which have used Holland's scheme and which have profitably capitalized on the use of discriminant analysis are reported in the literature (Southworth & Morningstar, 1970; Williams, 1972). These studies report accuracy of classification rates in the neighborhood of 55%, a noticeable improvement of 15-20% over the more typical high point code method. However, we are aware of no study in the literature which directly compares the validity of prediction of these two methods on the same sample of subjects. While some general notion of the relative validity of these two methods can be gleaned from the previous research, such comparisons are weak. They involve different techniques applied to different samples and consequently the differences in outcomes may be simply a function of sampling fluctuation. In order to avoid these problems the two techniques were contrasted on the same sample of subjects comparing high point code and discriminant function classification. The technique is also replicated on an independent sample of subjects from the same population.

Method

A total of 166 undergraduates participated as volunteers in this study. One hundred students served in one sample (VPI group) and an additional 66 students responded to the Occupations Scale of the SDS (SDS group). Inasmuch as the item content of the VPI occupational scales and the SDS Occupations Scale are identical, these two samples may be viewed as an independent replication of the technique. As a group, the students in this study represented a heterogeneous sample of the university population. They were sampled from large sections of an introductory psychology course and received extra course credit for participation. The mean age of the VPI group was 19.8 years; the group included 51 freshmen, 19 sophomores, 23 juniors, and seven seniors. This group expressed a moderately high degree of certainty as to their occupational aspirations (Mean = 2.97 on a certainty scale ranging from a low of 1 to a high of 4). The composition of the SDS group was similar in nature, having a mean age of 19.5 years and consisting of 32 freshmen, 18 sophomores, eight juniors, and eight seniors. This group was also reasonably certain of their occupational choice (Mean = 2.95). There were 36 males and 64 females in the VPI group and 36 males and 30 females in the SDS group. The departments in which these 166 students were pursuing degrees were as varied as their occupational choices, which included all six types in Holland's system. Data for this study were collected in a single session during which the student completed either the VPI or the SDS Occupations Scale and a questionnaire relating to background information, choice of occupation and the certainty with which that choice was made.

Results

The validation criterion used in this study consisted of the occupational aspiration stated by the respondent during the testing session. Each occupational choice was categorized according to one of the six types of Holland's classification scheme. Hence, among the subjects of the VPI and SDS groups, the criterion to be predicted was a six group configuration, each group representing the occupational aspiration of the subject's stated choice. This six group criterion was then predicted from the raw scores of the VPI or SDS scales by means of discriminant analysis. The numbers of correctly and incorrectly classified subjects for the VPI group and the replication sample (SDS group) have been presented in Table 1.

Insert Table 1 about here

The discriminant analysis for the VPI group extracted four significant discriminant functions the first two of which account for 45% and 29% of the variance and appear conceptually to be the most important. For the SDS replication, the discriminant analysis extracted two significant functions, accounting for 85% of known variance and consisting of 62% attributable to the first function and 23% attributable to the second. Chi square values for the VPI group functions were 189.04 and 114.42 ($df = 36, 25$, repectively, $p < .001$). Similar values of significance as reflected in Chi square for the SDS group were 85.64 and 39.00 ($df = 30, 20$, respectively, $p < .001$).

Classification of subjects from both studies into groups formed by occupational aspirations and predicted on the basis of VPI and SDS discriminant functions revealed that 63.2% of the VPI group and 60.3% of the SDS group were correctly classified by their respective discriminant functions. In contrast, classification analysis made on the basis of one-letter high point codes resulted in 42% correct classification for the VPI group and 50% correct classification for the SDS group. The differences of 21.2% and 10.3% represent a noticeable improvement in classification. The combined outcome of classification for an amalgam of both VPI and SDS groups yielded an average classification accuracy of 46% for the high point code method and an average classification accuracy of 62% for the discriminant analysis method, representing an average 16% improvement.

Discussion

The results of this study demonstrate that the use of discriminant analysis in research using Holland's classification system can signficantly improve the predictive validity of that classification scheme. These findings were obtained with both an initial and a replication sample in this investigation. The average increase in classification accuracy from discriminant analysis over that obtained from high point codes of one letter was about 16%. These findings corroborate the general level of improved accuracy reported in the literature to date when studies using high point codes are compared to those using a discriminant function. The present study, however, has employed the same sample of subjects in two independent replications to test this correspondence. Hence the results here are not attributable to unknown differences between samples on which the two techniques have been used. The fact that our findings are so similar to that reported in the past, however, allows one to be much more confident about those previous results, sampling bias aside. Hence, the present results and those appearing in previous literature lead one to conclude even more strongly that the use of discriminant analysis can serve a highly useful research function in maximizing the validity of Holland's classification scheme. In fact, such a strategy would be equally applicable to any classification system and not limited exclusively to Holland's scheme.

The criterion for forming discriminant groups in this study was the subject's own choice of anticipated occupation. Similar results may well have been obtained against a number of other equally useful criteria, and the use of other criteria certainly constitutes a fruitful area for further research and empirical validation. But given the fact that expressed choice has been repeatedly shown to be at least as valid, and sometimes more valid, a predictor of vocationally relevant criteria than measured interest, we feel that the results presented here have important implications for other vocationally related behaviors.

In the Holland classification scheme studied here, the full theoretical sophistication of the six-letter high point code can be achieved without the use of the 720-cell design as would be required in the high point code method. Using discriminant analysis, one can make inferentially stable predictions in the VPI system with as few as 60 subjects and have better than reasonable confidence that the results would replicate on an independent sample.

References

Cohen, J., & Cohen, P. Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum, 1975.

Holland, J. L. Manual for the Vocational Preference Inventory. Palo Alto CA: Consulting Psychologists Press 1975.

Holland, J. L. Making vocational choices A theory of careers. Englewood Cliffs, NJ: Prentice-Hall, 1973.

Holland, J. L. Manual for the Self-Directed Search. Palo Alto, CA Consulting Psychologists Press, 1972.

Southworth, J. A. & Morningstar, M. E. Persistence of occupational choice and personality congruence. Journal of Counseling Psychology, 1970, 17, 409-412.

Timm, N. H. Multivariate analysis. Monterey, CA: Brooks/Cole 1975.

Williams, C. M. Occupational choice of male graduate students as related to values and personality: A test of Holland's theory. Journal of Vocational Behavior 1972, 2, 39-46.

Table 1

Correct and Incorrect Classifications of Occupational Aspirations Predicted from Holland s Typology for VPI and SDS Groups

	Predicted Group[a]					
Actual Group	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Realistic	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Investigative	0 (1)	16 (9)	2 (1)	2 (0)	1 (1)	1 (0)
Artistic	0 (0)	2 (0)	10 (2)	3 (2)	0 (1)	0 (0)
Social	0 (0)	3 (2)	3 (3)	13 (11)	5 (0)	0 (2)
Enterprising	0 (2)	0 (3)	1 (1)	3 (2)	11 (12)	4 (3)
Conventional	0 (0)	0 (0)	0 (0)	0 (0)	0 (1)	9 (3)

[a]VPI group results are presented first in each pair SDS group results appear in parentheses.

Maximizing